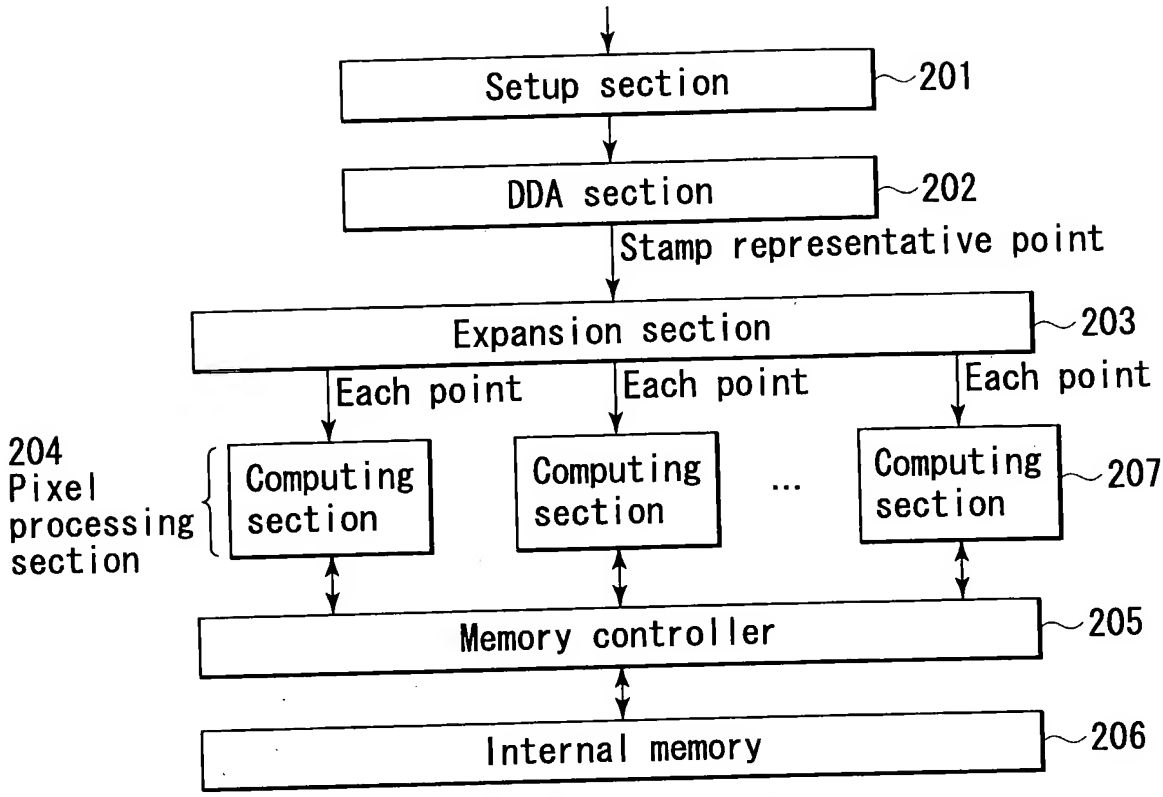



FIG. 1 (PRIOR ART)

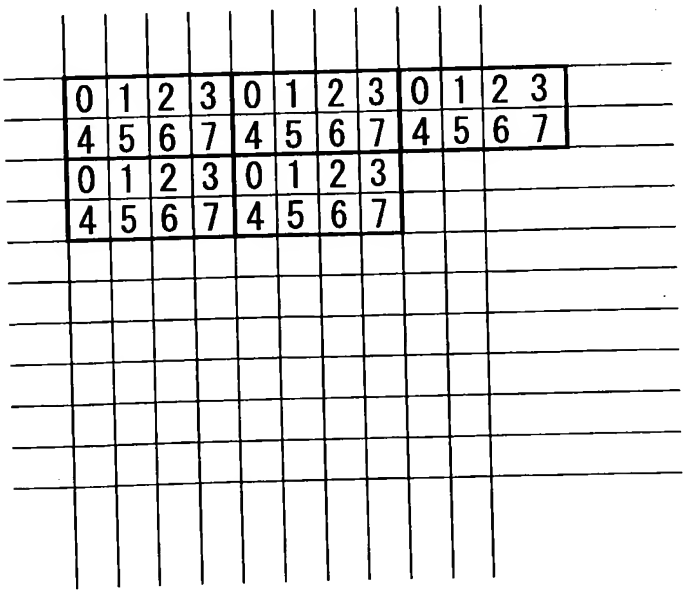



FIG. 2 (PRIOR ART)

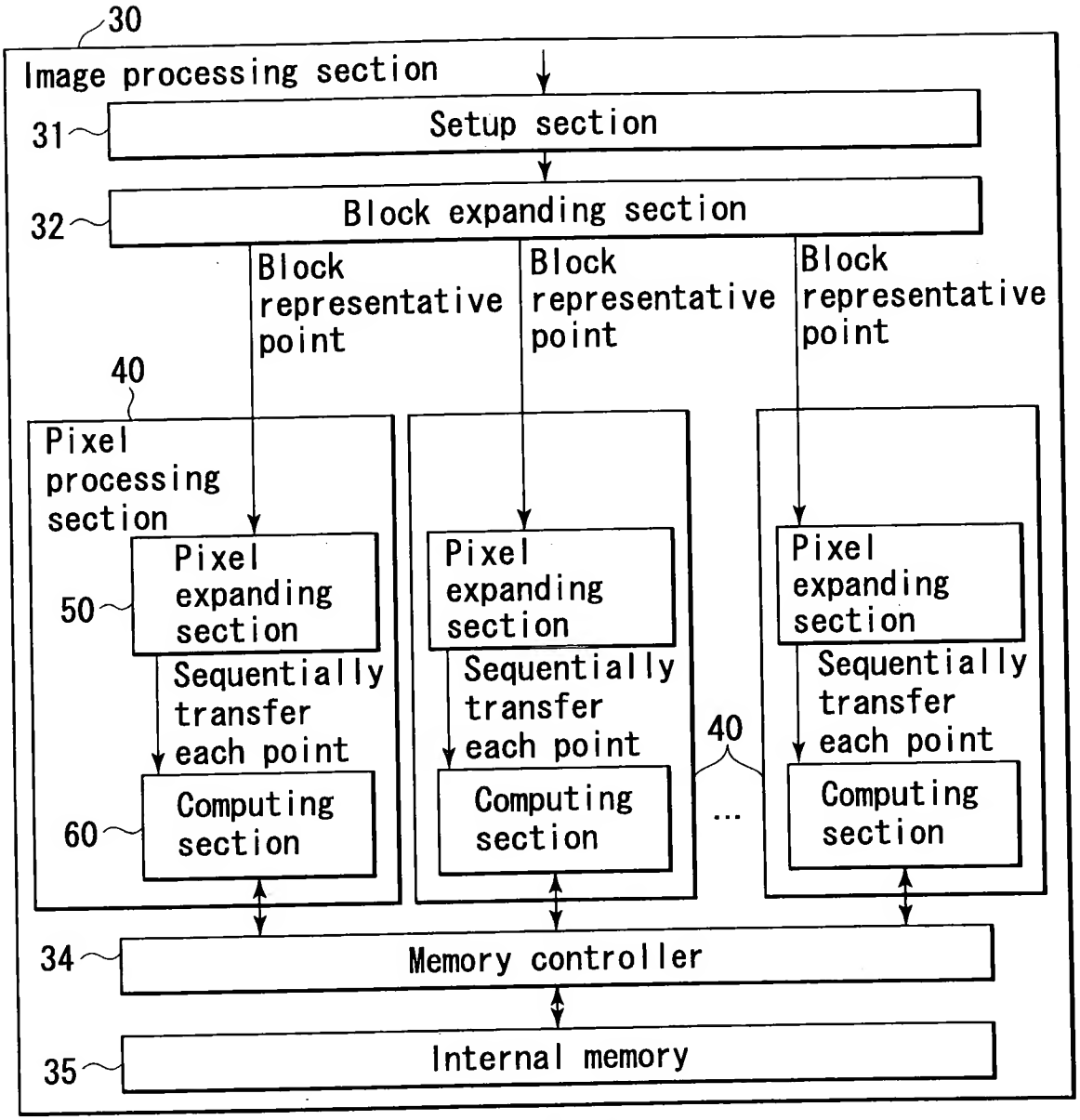

30
Image processing section
31
Setup section
32
Block expanding section
Block representative point
Block representative point
Block representative point
40
Pixel processing section
Pixel expanding section
50
Sequentially transfer each point
Computing section
60
Pixel expanding section
Sequentially transfer each point
Computing section
40
...
Pixel expanding section
Sequentially transfer each point
Computing section
34
Memory controller
35
Internal memory

FIG. 3

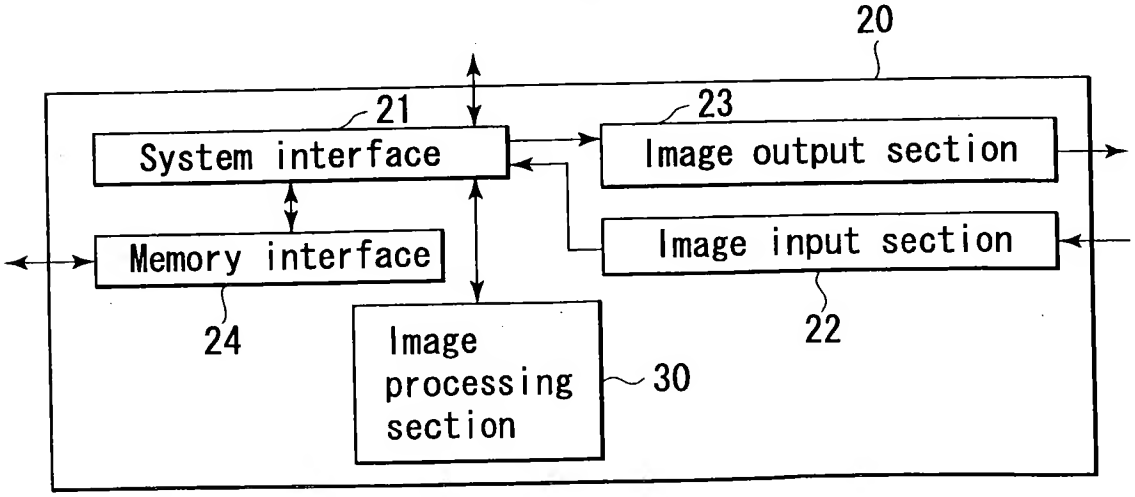

20
21
System interface
23
Image output section
Memory interface
Image input section
24
22
Image processing section
30

FIG. 4

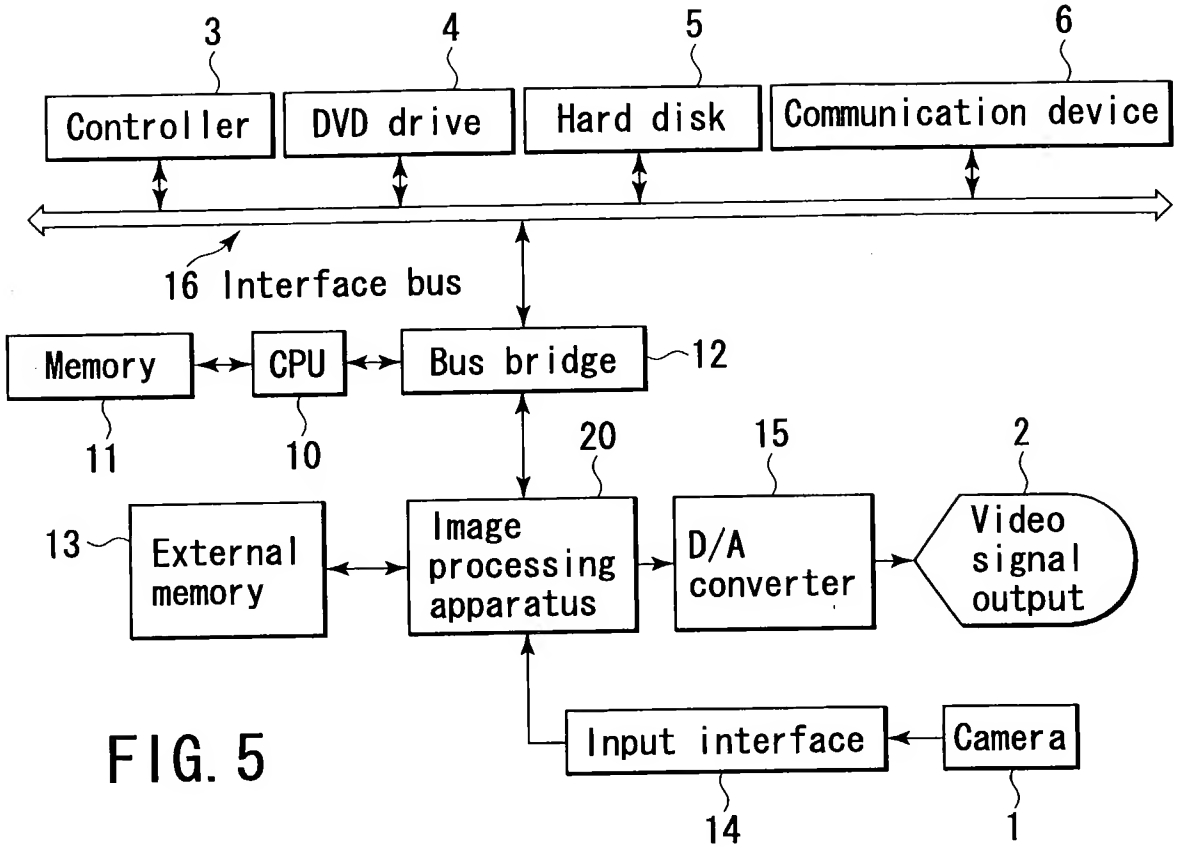



FIG. 5

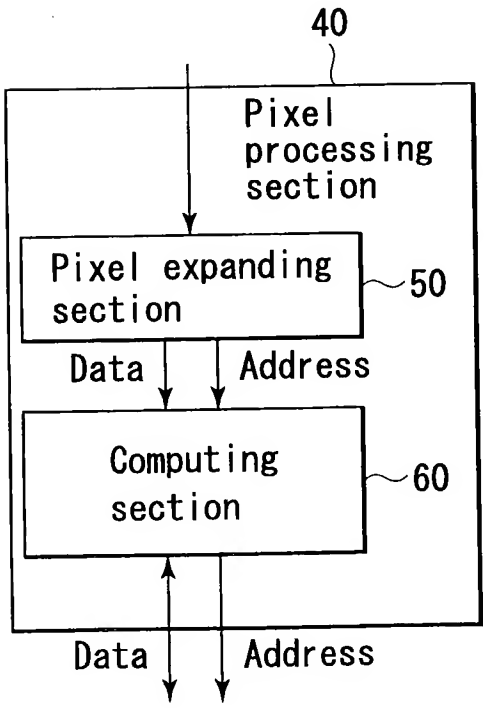



FIG. 6

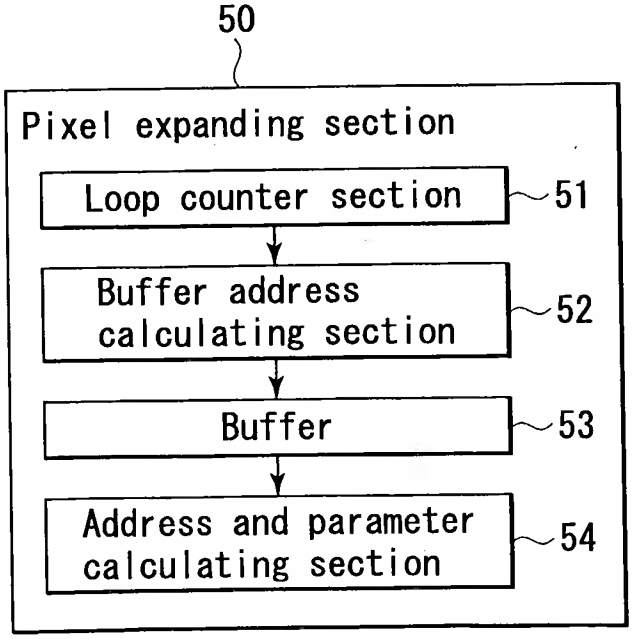



FIG. 7

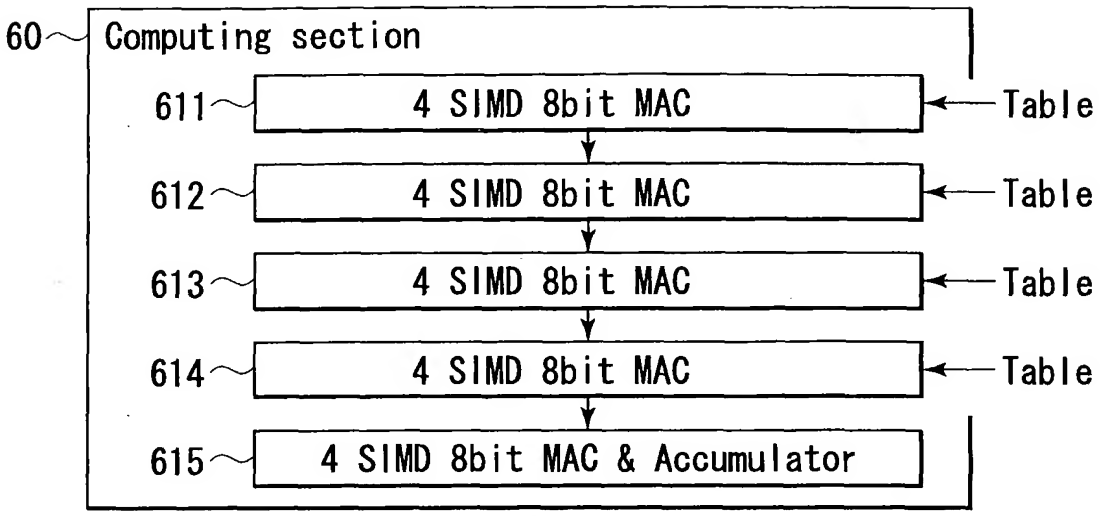

60
Computing section
611
4 SIMD 8bit MAC
Table
612
4 SIMD 8bit MAC
Table
613
4 SIMD 8bit MAC
Table
614
4 SIMD 8bit MAC
Table
615
4 SIMD 8bit MAC & Accumulator

FIG. 8

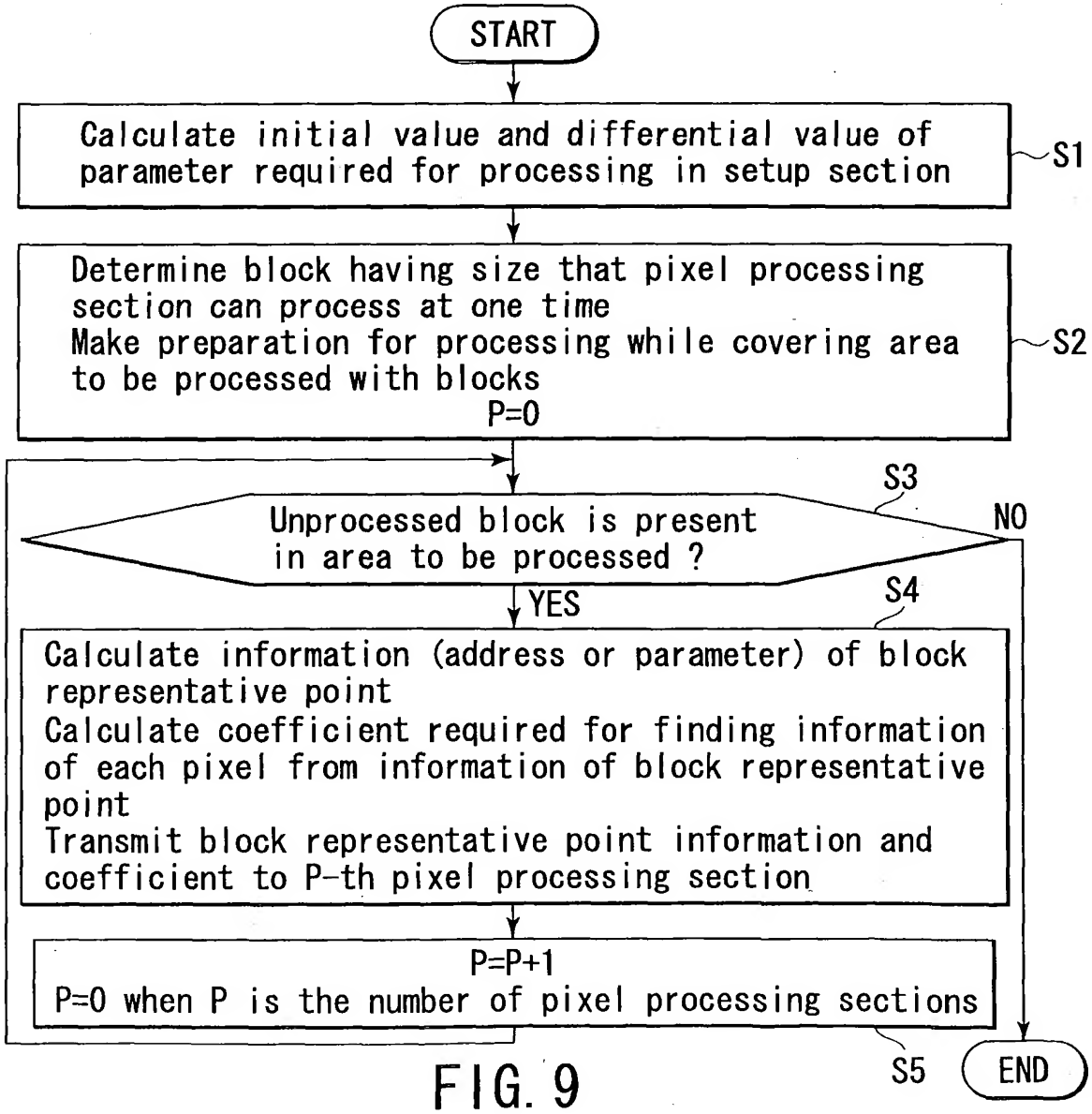

START
Calculate initial value and differential value of parameter required for processing in setup section
S1
Determine block having size that pixel processing section can process at one time
Make preparation for processing while covering area to be processed with blocks
P=0
S2
S3
Unprocessed block is present in area to be processed ?
NO
YES
S4
Calculate information (address or parameter) of block representative point
Calculate coefficient required for finding information of each pixel from information of block representative point
Transmit block representative point information and coefficient to P-th pixel processing section
P=P+1
P=0 when P is the number of pixel processing sections
S5
END

FIG. 9

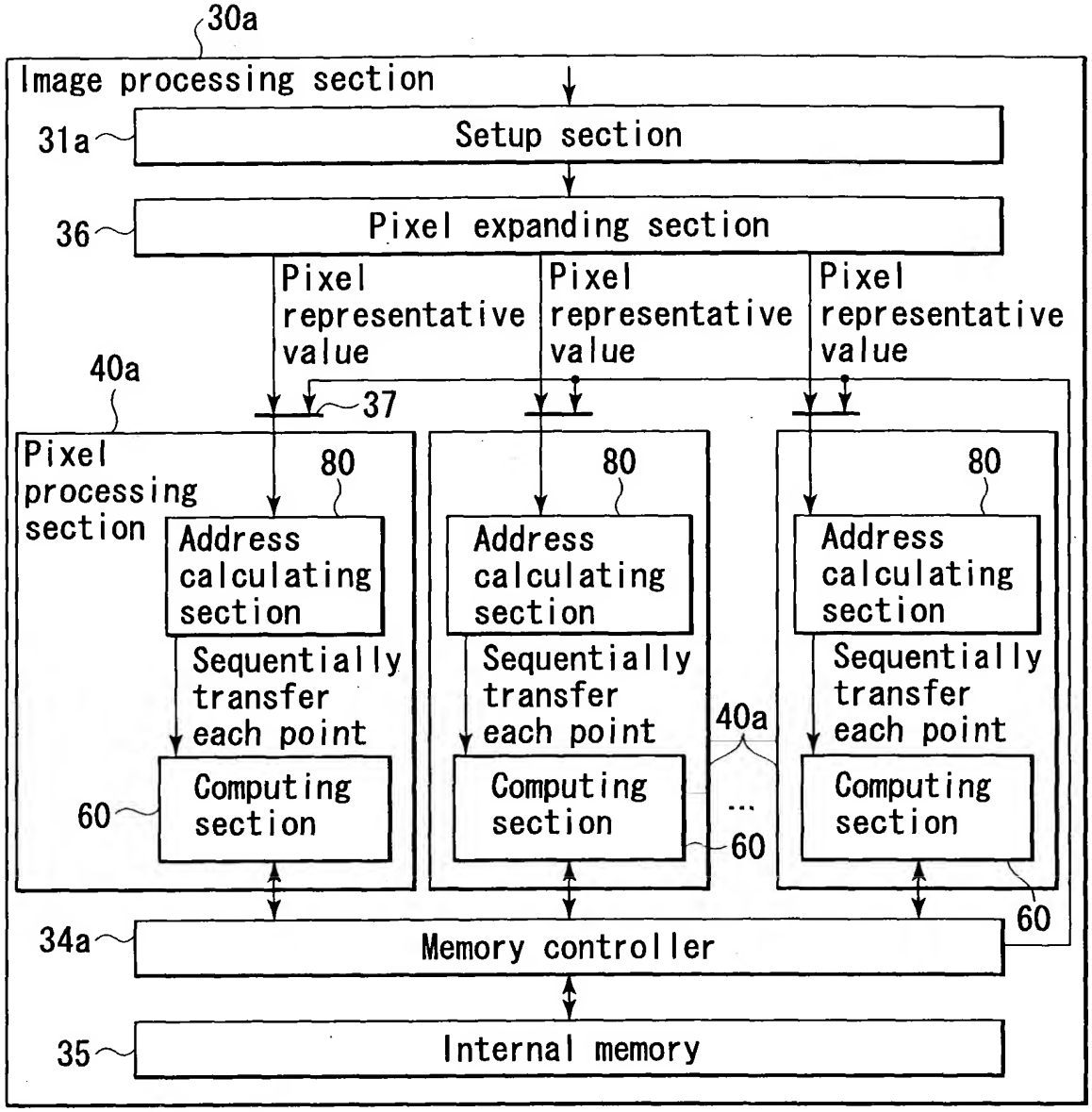

30a
Image processing section
31a
Setup section
36
Pixel expanding section
Pixel representative value
Pixel representative value
Pixel representative value
40a
37
Pixel processing section
80
Address calculating section
Sequentially transfer each point
Computing section
60
80
Address calculating section
Sequentially transfer each point
Computing section
60
40a
...
80
Address calculating section
Sequentially transfer each point
Computing section
60
34a
Memory controller
35
Internal memory

FIG. 10

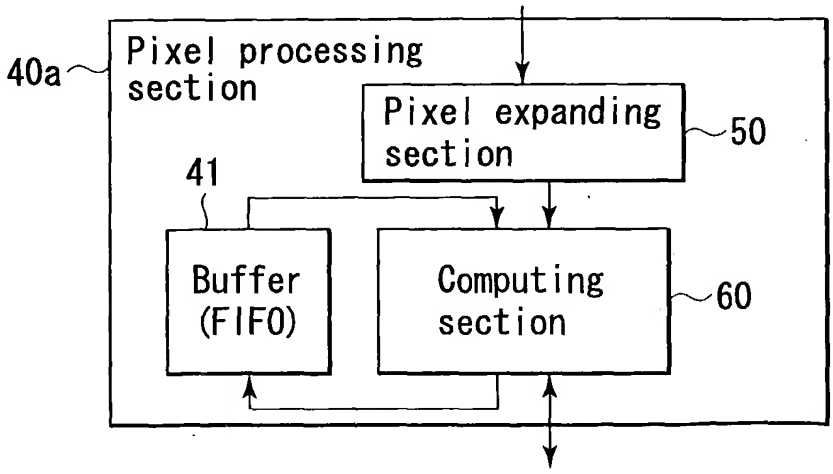

40a
Pixel processing section
Pixel expanding section
50
41
Buffer (FIFO)
Computing section
60

FIG. 11

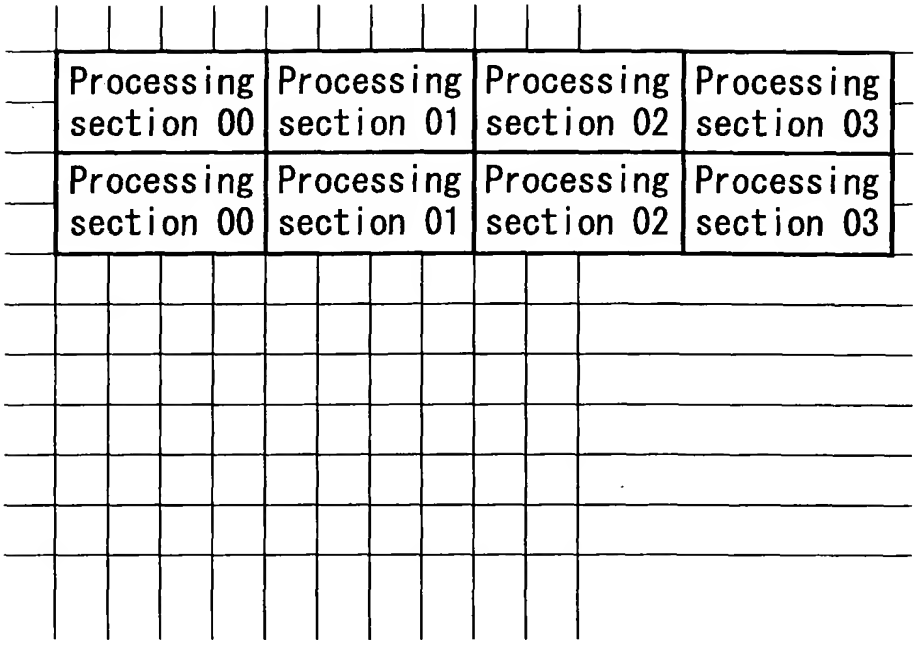

Processing section 00
Processing section 01
Processing section 02
Processing section 03
Processing section 00
Processing section 01
Processing section 02
Processing section 03

FIG. 12

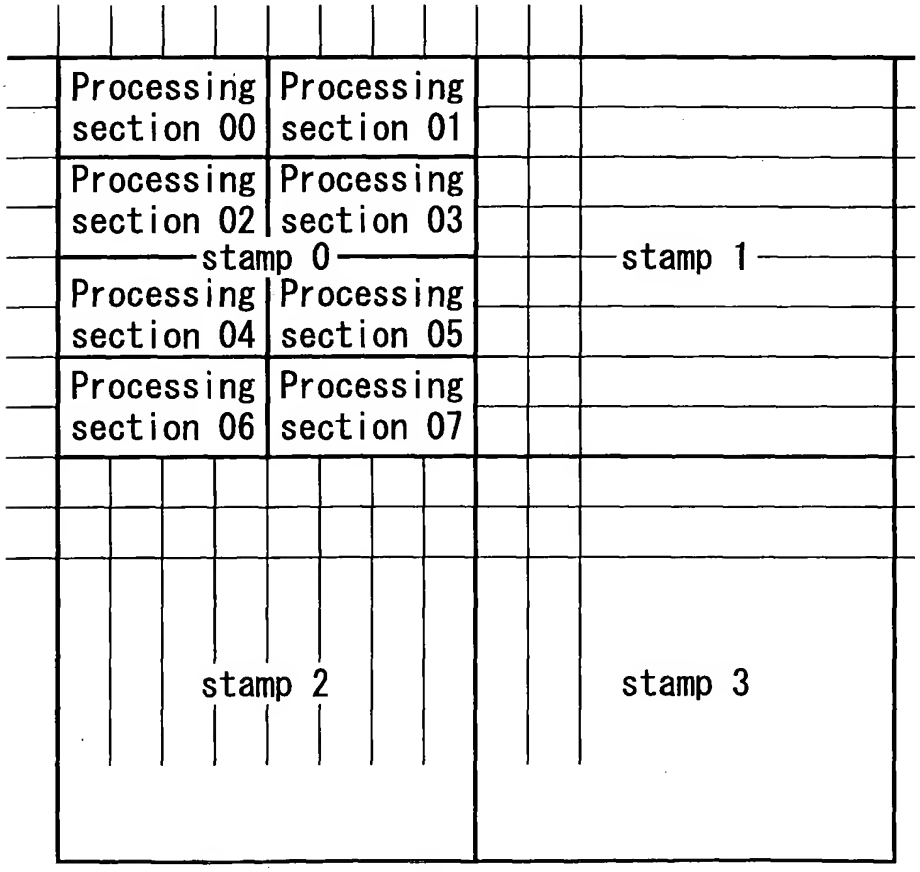

Processing section 00
Processing section 01
Processing section 02
Processing section 03
stamp 0
stamp 1
Processing section 04
Processing section 05
Processing section 06
Processing section 07
stamp 2
stamp 3

FIG. 13

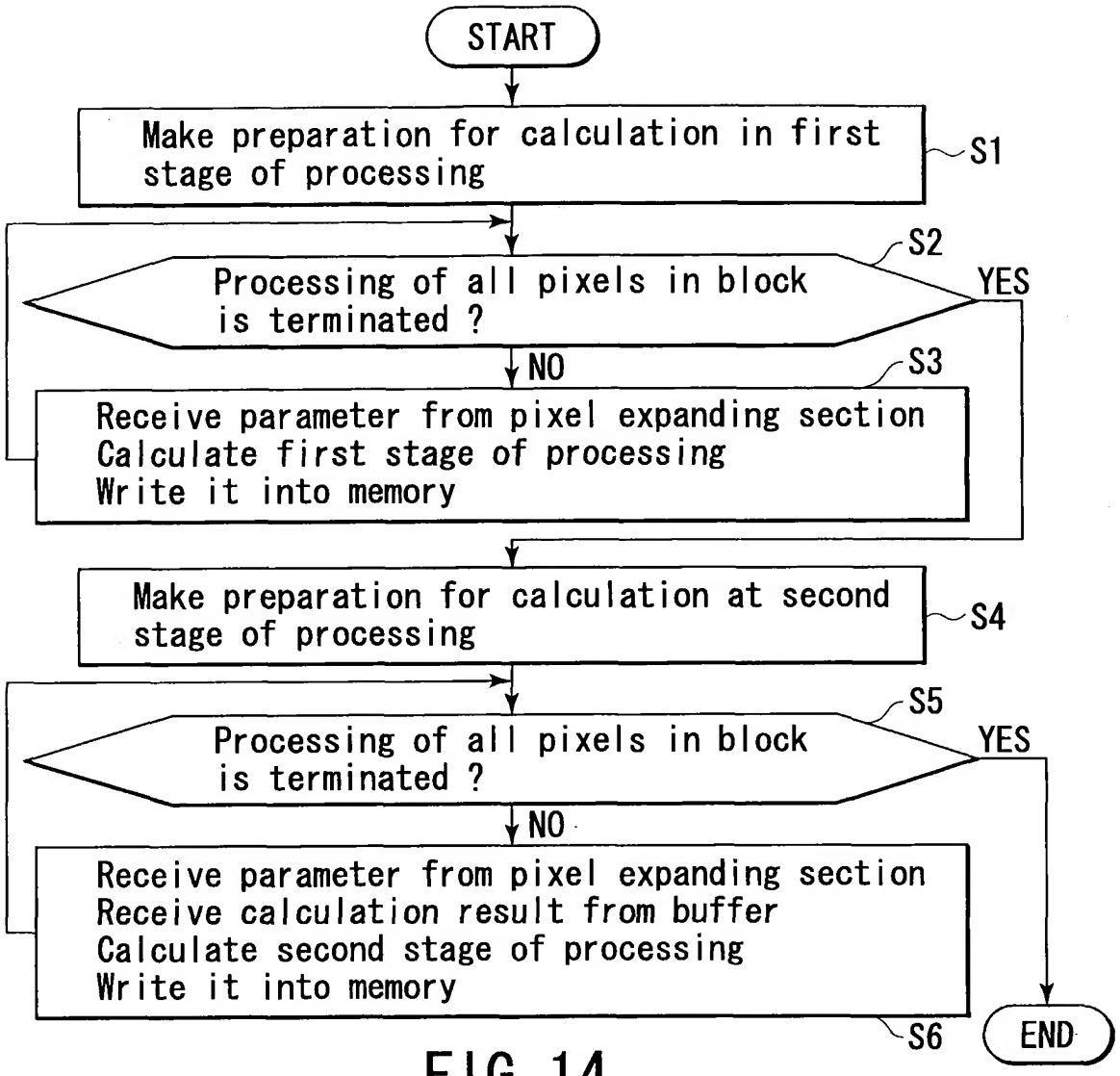

START
Make preparation for calculation in first stage of processing
S1
S2
Processing of all pixels in block is terminated ?
YES
NO
S3
Receive parameter from pixel expanding section
Calculate first stage of processing
Write it into memory
Make preparation for calculation at second stage of processing
S4
S5
Processing of all pixels in block is terminated ?
YES
NO
Receive parameter from pixel expanding section
Receive calculation result from buffer
Calculate second stage of processing
Write it into memory
S6
END

FIG. 14

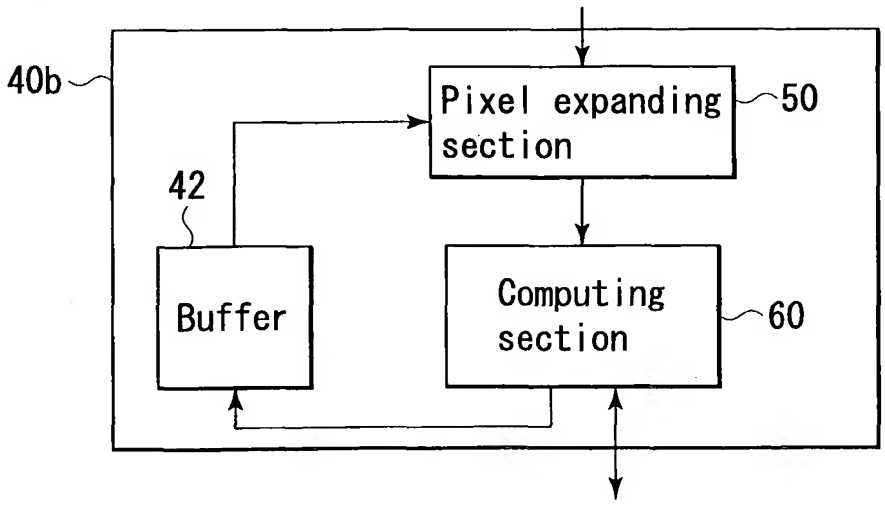

40b
Pixel expanding section
50
42
Buffer
Computing section
60

FIG. 15

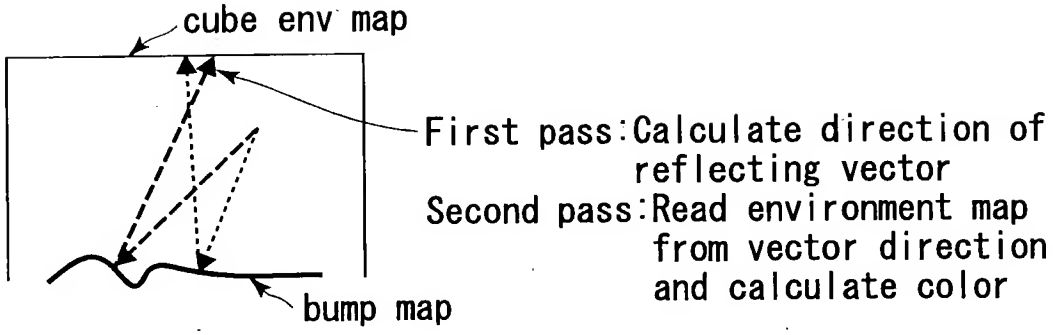

cube env map
First pass: Calculate direction of reflecting vector
Second pass: Read environment map from vector direction and calculate color
bump map

FIG. 16

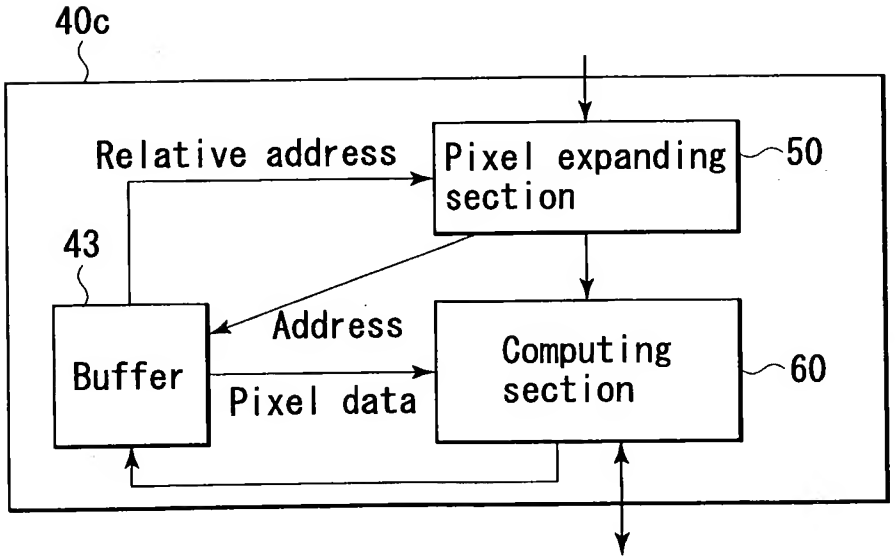
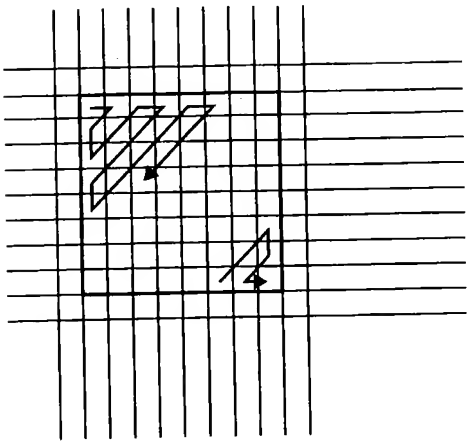

40c
Relative address
Pixel expanding section
50
43
Address
Buffer
Pixel data
Computing section
60

FIG. 17



Relative address data
(0, 0), (1, 0), (0, 1), (0, 2), (1, 1), ·····, (6, 7), (7, 7)

FIG. 18

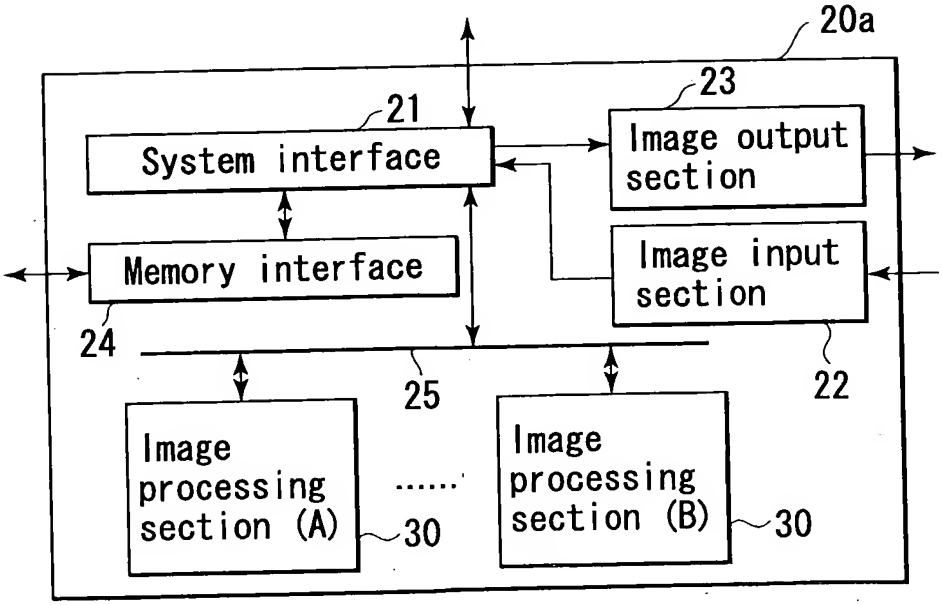



FIG. 19